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December 20, 1993

By Hand

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, NW
Washington, DC 20554

Re: Ex Parte Presentation
CC Docket No. 92-297
LMDS Rulemaking

Dear Mr. Caton:

On behalf of Suite 12 Group ("Suite 12"), petitioner in the above-referenced rulemaking proceeding, enclosed please find two (2) copies of a supplement to Suite 12's November 22, 1993 filing titled "The CellularVision Modulation Choice" ("Digital Study"). In the Digital Study, Suite 12 demonstrates that current digital compression technology produces bit rates in the 2 to 3 Megabits/s range, resulting in video pictures of inferior quality; moreover, Suite 12's Digital Study confirms that the cost of digital compression equipment, to the extent it is commercially available, is so high that it is prohibitive for current utilization by licensees of LMDS, which is a competitive alternative to cable and other voice and data services.

This supplemental submission consists of several important recent press articles which detail the uncertain prognosis regarding the development of both digital compression technology and the commercial availability and cost of digital equipment. These articles provide significant independent confirmation of concerns raised by Suite 12's study about the unsoundness, from a public policy perspective, of having allocation decisions regarding LMDS dependent upon the advent of digital compression technology. To do so could cripple the deployment of LMDS in its infancy.

Specifically, The Wall Street Journal article of November 29th surmises that the explosion of channel availability, and most of the accompanying interactive video TV

technology based on digital compression, is "a decade or more away." The article concludes that digital compression equipment expenses are currently exorbitant — the high capacity cable boxes alone that are needed for every U.S. subscriber's home "would cost about $33 billion." Likewise, the Electronic Engineering Times article of November 29th states that "the digital set-top box . . . threatens to bust the budget of cable operators and consumers alike." The article adds that there are no definite answers as to how the price of such equipment will come down. Finally, Multichannel News notes in its November 29th edition that from a cable operator's standpoint, "the costs and benefits — as well as the performance — of digital video have yet to instill the same confidence [as fiber optics]."

By contrast, the CellularVision technology is currently capable of providing consumers with a high quality, low-cost video alternative to cable which simply would not be available were Suite 12 to rely on commercially available digital compression technology and equipment.

Please place these two copies of this supplemental attachment into the above-referenced docket. Any questions regarding this attachment or the study should be directed to the undersigned.

Sincerely,

Michael R. Gardner
Charles R. Milkis
Counsel for Suite 12 Group

Enclosures

THE WALL STREET JOURNAL
MONDAY, NOVEMBER 29, 1993

Highway of Hype

Despite Many Claims For 500-Channel TV, Long Road Lies Ahead

Costs to Industry, Consumers Appear Sure to Be High; And Will People Want It?

Tests Show Limited Interest

By MARK ROBICHAUX
Staff Reporter of THE WALL STREET JOURNAL

LITTLETON, Colo. — Television viewers in this leafy Denver suburb are getting a sneak preview of the much-vaunted 500-channel future.

Here, Tele-Communications Inc., U S West Inc. and American Telephone & Telegraph Co. are trying to gauge the market for what will probably be one of the most salable features of interactive TV: "movies on demand," or virtually any movie at any time, available with a few clicks of a remote control.

The experiment is a crude version of the marvels of interactivity being touted for the 21st century: When a viewer orders a movie, a beeper at test headquarters alerts an employee to plunk a videotape in one of scores of VCRs lining the walls.

A Crucial Experiment

High-tech it's not, but the Littleton test does fill a void. For despite the megabillions that cable TV and telephone companies are wagering on the coming "information superhighway," this trial is one of the first attempts to determine whether viewers will go along for the ride.

TCI and its partners recently announced "high demand and usage" in the 320 homes in the test, which began in July 1992 and will run a few more months. Although the companies decline to identify test subjects, a test-site manager says he is "very pleased" with results. But knocking on doors in the test neighborhood of neat frame houses turns up some sour notes amid general praise for the service's convenience.

The test customers aren't charged a monthly fee or installation costs; they pay only the price of a movie, ranging from 99 cents to $3.99. Nevertheless, high-school teacher Penny Crouse buys only two movies a month from the service. "We simply don't have time to watch TV," she says. "The homework I bring home is phenomenal. I've been reading since I got home, and I'll work until 10 tonight."

Karen Lumpkin, who buys two or three movies a month, says she is too overloaded with home technology to make more use of interactive TV. With the telephone, personal computer and fax machine she uses to run her antiques business, by day's end she says she doesn't want to push another button. "When I watch TV, I don't want to do anything but watch," she says.

The Industry Hype

Viewers' voices have been lost in the hype over interactive media. Some of corporate America's most sagacious chief executives—including TCI's John Malone, Bell Atlantic Corp.'s Raymond W. Smith and Microsoft Corp.'s William Gates III—are convinced that they need only build and the people will come. And the cable industry terms any naysaying premature.

"I guess we could all throw up our hands and say, 'There's risk here — we can't proceed,' " says Robert Thomson, a TCI senior vice president. "Of course there's risk!"

But viewers' reservations are just one of the obstacles to be reckoned with before the information highway is up and running. Such a system will take far longer and cost far more than the public generally realizes. A staggering hardware buildup will be needed to deliver a wide assortment of interactive services into living rooms. The cost of blanketing the nation with fiber-optic cable and state-of-the-art digital equipment will be the rough equivalent, in today's dollars, of building the interstate highway system.

By conservative estimates, the bill will total at least $100 billion, about equal to the combined current revenue of the cable and regional telephone industries. And because some key technology is still being developed, the cost could be much more.

Willing to Pay?

The plan is to pass much of the cost onto consumers through higher cable-TV rates. But the public's willingness to pay is a question troubling even bullish multimedia frontiersmen. After all, consumer fury over soaring deregulated cable rates prompted passage of the 1992 Cable Act, which sought to limit rate increases.

"I feel like laughing when they talk about 500 channels," says Ruth Meurer, a cable subscriber in Jacksonville, Fla. "Your cable bill would exceed your monthly mortgage payments."

And just what would viewers be buying? For starters, it won't necessarily be 500 channels. That arbitrary number slipped into usage after a TCI news conference last year, when Mr. Malone mentioned that new digital-compression technology could raise the capacity of existing cable channels tenfold. Reporters multiplied that by the 50 channels now carried on TCI's cable systems, and after the next day's headlines, the 500-channel number stuck.

The number of channels is likely to vary from community to community. But digital compression—by squeezing more channels onto conventional coaxial cable—certainly will explode the number of viewing options. Many new channels will be tailored to special "niche" interests, and movie

Highway of Hype: Despite Much Enthusiastic Talk About 500-Channel TV, Many Obstacles Lie Ahead

Continued From First Page

channels will proliferate. Beefed-up pay-per-view systems offering a wide selection of releases every 15 minutes or so will lead eventually to movies-on-demand.

Later, viewers may get push-button home shopping, televised classes, interactive pay-per-view events and concerts, electronic libraries and interactive games and data services. Other channel capacity will be devoted to high-definition TV, which will enable new TV sets to display video that resembles film quality.

To navigate this sea of information, channel surfing will be out of the question: scanning 500 channels would take 43 minutes, according to industry engineers. Subscribers will probably push remote controls to select from on-screen program guides showing categories such as news, sports or comedy—much as today they use a mouse to pull up computer files.

Most of these services are a decade or more away. And it may take at least that long for the marketplace to catch up with the video visionaries. "There is no crying demand from consumers for additional services and interactive TV right now," says Joseph Segel, a cable pioneer who built QVC Network Inc. into a $1 billion home-shopping empire, then sold it to media mogul Barry Diller last year.

The Optimistic Arguments

The companies championing these new services contend that they will come sooner than skeptics believe. They note anticipated technological breakthroughs that should eliminate the cumbersome glitches that have frustrated early users. They add that if viewers are persuaded they can save time or money with a service, such as home shopping, they will embrace it.

"Interactive TV is going to happen," says Thomas A. Grieb, director of interactive services for GTE Corp. "Remember, they called CNN the Chicken Noodle Network, but today CNN has changed the way we get our news."

Nonetheless, consumer surveys show that viewers are satisfied with TV as they know it; their complaint with cable is not lack of choices but cost and program quality. Although they currently are offered 30 channels or more, only 61% of the nation's homes with access to cable subscribes to it. And subscribers still mostly watch the three major broadcast networks. Similarly, home shopping is offered to about 50 million subscribers, but only eight million use it to buy products.

According to a study to be released today by Decision Resources Inc., Americans aren't likely to spend much more for entertainment than they do now because average household income is down $2,000 in real dollars from its 1989 high. "When your basic cable bill gets up to $40 to $50 a month, you start to pay a lot of attention to it," says Martyn Roetter, a vice president of the Waltham, Mass., consulting firm. "Consumers will ask: 'Is TV really worth that?' "

He adds that people are watching less programmed TV — though more home videos — now than in the mid-1980s. They have less leisure time; they worked 53 more hours in 1989 than in 1969. And, he notes, the most affluent — presumably interactive media's prime market—have the least time.

Dreams of a Pot of Gold

"Everybody is convinced there are huge pots of gold out there," says A. Michael Noll, dean of the University of Southern California's Annenberg School for Communication. "They're putting big money on the table this time. But history says no way." And early experiments with interactivity do bode ill for quick acceptance. "We are a nation of people who can't program a VCR," says cable veteran Gus Hauser. The new services have to be extremely simple, he adds.

Mr. Hauser should know. Sixteen years ago, as chief executive of Warner Cable Communications Inc., the forerunner to Time Warner Cable, he launched QUBE, an experimental interactive service in Columbus, Ohio, that lost an estimated $20 million before Warner pulled the plug in the mid-1980s. The technology was expensive and cumbersome, yet former QUBE executives insist Warner folded it before it had time to find its audience.

A similar fate befell videotex, on-line data services transmitted to TV screens and computer terminals. In 1983, Miami-based Knight-Ridder Inc. began pouring an estimated $50 million into a system that offered 20,000 customers an "electronic newspaper" and other data. Times Mirror Co. put up about $30 million testing a similar service in Southern California. Neither venture proved viable; viewers balked at reading reams of text from a screen and at steep hourly access fees and costly equipment rentals.

In more recent tests, viewer reviews of interactivity have been mixed. The 350 residents of Cerritos, Calif., who subscribe to GTE Corp.'s "Main Street" pay $9.95 a month for more than 65 different services, including games, stock quotes, bill-paying, flight reservations, shopping and an encyclopedia. In GTE's experience with "Main Street" here and elsewhere, 25% to 50% of subscribers drop the service each year and are replaced — a "churn" rate about equal to that of pay-cable services.

One Corporate Projection

Nonetheless, GTE says the Cerritos experiment persuaded it to continue rolling out "Main Street" into new territories; it is projecting a million subscribers within five years. "We will make money when we get the penetration we want," says a GTE spokesman, who doesn't specify an exact goal. "It is an evolutionary change in TV, not revolutionary."

TCI's Mr. Thomson stresses that the new equipment and services will be brought out gradually, as demand emerges, and that prices will be market-driven. TCI, he contends, has pursued a "measured and focused" course, and that whatever happens, its investment in new technology will pay off by improving existing cable service. And although conceding a need for more tests of interactivity, he adds: "Our tests so far indicate there will be demand early on," especially for movies-on-demand, interactive classes between two or more locations and interactive home shopping.

Indeed, optimistic studies about the potential for interactive TV abound. A recent survey from Chilton Research Services found that six in 10 adults expressed interest in the potential of interactivity, and 86% of them say they would definitely

r probably watch video on demand.

The industry's strategy makes sense to John Carey, director of Greystone Communications, a Dobbs Ferry, N.Y., telecommunications-research firm. Conventional market research is all but useless when the product is high-tech and blue-sky, he says. Surveying consumers about their hypothetical preferences in interactive multimedia, he argues, is akin to asking, "Would you buy a dog that could fly?" He adds: "The only way you can get a handle on this is to go into the field with real services."

To that end, cable and phone companies are rapidly tooling up for the interactive future. After Bell Atlantic and TCI complete their proposed merger, the combined company plans to spend $15 billion over the next five years upgrading its networks. During the same period, Time Warner Inc. and partner U S West will spend $5 billion on upgrades. And Pacific Telesis Group plans to spend $16 billion over seven years for a fiber-optic network to carry telephone, cable-TV and interactive services to its California customers.

Another Test Due Soon

The nation will soon get its first glimpse of a high-capacity, "full-service" network. Early next year, Time Warner will begin offering state-of-the-art services in Orlando, where it is deploying fiber-optic cable and powerful set-top converters in 4,000 test homes. Among the offerings: movies-on-demand, interactive shopping, video conferencing, games and televised classes. Viacom Inc. begins a similar test next year in Castro Valley, Calif., where viewers will get interactive versions of its MTV and Nickelodeon channels, among other services.

With only about a third of the nation's subscribers now wired with fiber-optic cable, expanding this high-capacity wire to cities coast to coast will cost the industry some $20 billion, according to the National Cable Television Association. Interconnecting various systems — to permit a user in Los Angeles, say, to play a video game with someone in Chicago — would cost another $14 billion.

Cable companies must also buy digital-compression equipment for their control centers — as well as high-capacity cable boxes for every subscriber's home. To put a box in every U.S. home with a TV would cost about $33 billion.

One critical piece of hardware isn't even commercially available. It is the digital file server, a powerful computer that functions like a giant jukebox, storing and sorting vast quantities of digitized video and data and switching it to viewers. Security problems and design uncertainties with these computers could push the industry's hardware costs above the $100 billion estimate. For example, no one knows how much capacity will be needed — only that it will be massive, to avoid information bottlenecks as millions of messages clog the wires at peak hours.

Threat to Existing Services

Hardware costs are only the beginning. Many analysts and even industry executives are skeptical about the new services' ultimate profit potential. The new features are likely to cannibalize existing services, generating little incremental revenue. Movies-on-demand will surely crimp sales of premium cable channels such as Home Box Office; HBO's growth in subscriber homes, now totaling about 17 million, is already stagnant. And John Sie, chairman of the pay-cable service Encore Media Corp., doubts that movies-on-demand will capture all the revenue now going to video-rental stores. He says that even if movies-on-demand takes half the "recent hits" video-rental market, it would generate only about $1 billion a year in cash flow for the entire cable industry.

Mr. Sie says forecasters also gloss over the costs of programming new special-interest channels. "It takes a lot of programming to fill a 24-hour channel," he says. "And consumers don't want schlock." Even the cheapest video format — talk shows — costs about $20,000 an hour, he notes. As the audience fragments over a multitude of channels, he adds, narrow-interest programming won't be cost-effective for advertisers.

The rapid convergence of the cable and telephone industries suggests other hidden costs to Tom Wolzien, an analyst at Sanford C. Bernstein & Co. in New York. Recent mergers will for the first time pit entrenched cable and telephone monopolies against one another in costly turf battles, he says, adding that nobody is factoring in the bottom-line pressures of defending existing markets and raiding competitors' territory.

With so many imponderables, few even hazard a guess as to when interactive multimedia might begin paying off. Mr. Wolzien estimates that interactive and pay-for-view revenues will contribute less than 5% to combined cable and phone-company revenues through 1998. That number could eventually reach about 20%, he believes, once the hardware is in place — and provided a market develops. That, of course, may be the stickiest proviso of all. "Don't forget," Mr. Sie says, "we still have black-and-white TVs out there."

WESTERN CABLE SHOW TO OFFER PEEK AT DIGITAL-TV FUTURE

Set-top box could be budget buster

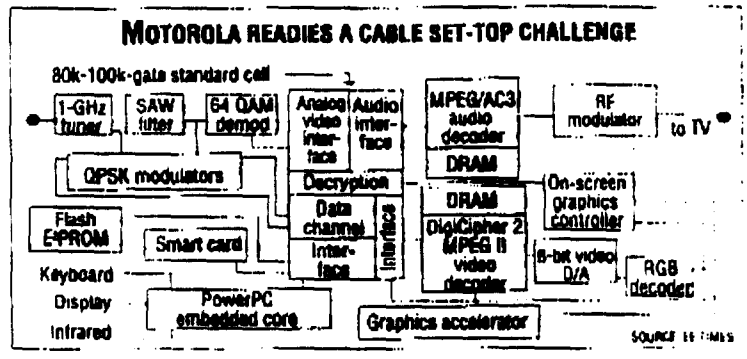
BY JUNKO YOSHIDA

Anaheim, Calif. — Cable television operators will get a peek into the digital future when the Western Cable Show convenes here this week. The event may mark the dividing line between today's simple, analog broadcast cable systems and the interactive, intelligent digital cable systems of tomorrow.

The focus of the show is likely to be the digital set-top box: a bewilderingly complex blend of communications node and 32-bit workstation that threatens to bust the budgets of cable operators and customers alike. As cable operators squint into the near-term digital future, they will likely ask two questions: Who can provide the functions needed for the set-top box, and how can we get the price down?

None of the potential answers

Continued on page 8



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appears definitive. The problem is the still-undefined functionality of the digital set-top box. What's clear is that the unit will have to receive an analog signal from the cable, decode it into a digital signal using a yet-unestablished demodulation scheme and decompress the digital signal into NTSC fare using any of a number of video and audio decompression algorithms.

There are uncertainties enough in that scenario, but the biggest question mark is the issue of interactive graphics. Cable operators are sure they want some sort of local graphics capability beyond the simple display of decoded television images, but they're not sure what they'll need.

That uncertainty has forced designers to cram an enormous pool of hardware into set-top prototypes. The units have been variously described as a cable decoder plus a Silicon Graphics workstation and as a 3DO box with a computer.

Various vendors have already proposed digital cable set-top box architectures for cable operators' consideration. Silicon Graphics Inc. and Time Warner Inc. have jointly fielded an interactive digital TV architecture based on the MIPS Technologies R4000 family. A PowerPC-based set-top box is the brainchild of Motorola Inc., Scientific-Atlanta Inc. and Kaleida Labs (see diagram, page 1). Intel Corp., Microsoft Corp. and General Instrument Corp. have jointly devised a platform using the Intel X86 architecture. And Microware's OS-9-based digital set-top box turnkey solution uses the Motorola 68000.

According to one industry pundit, a high-end digital converter box might incorporate a PowerPC-level CPU, audio and video decoder ICs, a demodulator IC, an ASIC for transport and multiplexing, a graphics accelerator, a smart card for downloading conditional access, a 512-kbit × 6 flash E²PROM for storing an upgradable operating system, a QPSK modulator for upstream data, a 1-GHz tuner, an infrared remote control IC for smart links with other peripherals, DRAMs and other off-the-shelf parts, such as A/D and D/A converters and an NTSC encoder. It could easily cost more than $700 to manufacture such a system, substantially more than the $250 to $300 apiece cable operators have said they would be willing to pay.

The cost issue has spurred a grass-roots search for alternatives. Toward that end, cable operators have followed the lead of personal-computer vendors in invoking the "open architecture" as a talisman against high costs.

"In the digital interactive cable business, we won't be able to afford a closed network system, where our General Instrument set-top box used in one [geographical] area won't be able to talk to a Zenith box deployed in another region," said Dale Bennett, vice president and state manager at TCI Cablevision of California Inc. (Walnut Creek, Calif.). "We need good interfaces to ensure interoperability."

"The Western show this year could be the last gasp of the hypemeisters," quipped Roger Kozlowski, vice president and technical director of the Motorola consumer segment. "Many cable operators want to see a reasonable level of competition among set-top boxes and make sure that their critical components are supplied by multiple sources. They would certainly not like to see their system locked into a proprietary architecture, dominated by one software vendor."

range of new services, cable operators need a system that's sufficiently flexible "to grow into the future," Frick said.

One likely highlight of Western Cable's open-architecture presentation will be an HP demonstration in which two Motorola-architecture-based and two Intel-based set-top boxes access a common server that manages storage and transmission of program material. Three different services—movies-on-demand, news-on-demand and shopping-on-demand—will feed into the set-top boxes simultaneously via a single video server to demonstrate interoperability and interchangeability. HP developed a command language for the demo, downloading the language in software to each set-top box so that each can talk to the same server, said market development manager Casey Lemus at HP's Interactive Television Appliances group (Santa Clara, Calif.).

"HP's mission is to help cable operators design cost-effective solutions to support multiple set-top boxes—preserving differentiative features—and to help them define interface specifications for implementing an open architecture system," said Frick.

The interface-definition effort is likely to extend to more than commands and data streams over the cable. Some vendors and operators are suggesting that even the hardware and software interfaces within the box should be standardized, since that would allow direct competition at the chip level, which could drive costs down.

The standardization effort could serve the interest of IC vendors as well as cable operators. With the proliferation of box architectures, sales volumes for any one chip may

BIG SILICON QUESTIONS CLOUD PICTURE FOR DIGITAL CABLE SET-TOP

Unresolved issues include functionality of box, high prices and identities of key players

System	Architectural implementations	Key players
Microprocessor	68000 X86 PowerPC R4000 derivative	Motorola Intel Motorola MIPS Computer
Video decoder IC	MPEG-2 video	LSI Logic, SGS-Thomson, C-Cube, TI, Integrated Information Technology, AT&T, IBM, Toshiba, Motorola
	DigiCipher-2	General Instrument (GI)
Audio decoder IC	MPEG audio	LSI Logic, TI, Motorola
	AC-3	GI, Zoran, TI
Demodulator IC	64-QAM	Motorola, Philips, GEC Plessey
	16-VSB	Zenith-LSI Logic
Transport and multiplexing	Standard-cell ASIC solutions	LSI Logic, Motorola
Graphics chip set	Graphics engine	3DO, Commodore, Atari

SOURCE: EE Times

HP has an idea

At the leading edge of the open-systems discussion at Western Cable will be a proposal from Hewlett-Packard Co. Whereas the computer world's idea of an open architecture is essentially a de facto standard based on the dominant operating system and microprocessor, "we don't find that's what cable operators are looking for," said Laurie Frick, marketing manager of interactive television appliances at HP. "We think that open architecture in the cable world requires a radical departure—in thinking and in system implementation—from that of a PC model."

With the interactive digital market expected to spawn a vast

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be minuscule. If a silicon vendor must, for example, add DigiCipher-2 to an MPEG-2 video decoder, make two different audio decoder chips (AC-3 and MPEG audio) or bet on either 64-QAM (quadrature amplitude modulation) or 16-VSB (vestigial sideband) demodulation, set-top box costs could be propelled into deep space.

Same old swamp

Silicon vendors thus find themselves in a familiar quagmire. If they pursue proprietary relationships with individual cable companies, they may find only small, captive markets for their costly designs. But if they participate in the construction of an open architecture, they may confront a lack of differentiation and suffer subsequent price erosion.

Still, for many vendors the opportunities inherent in a product packed with silicon of all stripes outweigh the risks of commoditization.

LSI Logic Corp. is a leading advocate of the interactive digital TV business. "We want to make sure that we participate in the development of every key silicon that goes into a set-top box," said Simon Dolan, marketing director of LSI's Digital Video Division (Milpitas, Calif.). In addition to the MPEG-1 audio and video decoders and Reed-Solomon encoder/decoders it introduced earlier this year, the company will sample MPEG-2 video decoder chips to key customers in January, Dolan promised.

LSI Logic also recently announced a plan to develop a 16-VSB demodulator/forward error correction (FEC) chip with Zenith Electronics Corp. (see Nov. 22, page 4).

The company's MPEG-2 video decoder will provide a full support to the Main Profile/Main Level of the MPEG-2 standard, including bidirectional frames. It will implement such features as dual prime prediction, adaptive field/frame IDCT, motion compensation and 16 × 8 field motion compensation, non-linear quantization, and error concealment vectors. Some of those functions "may not be necessarily supported by other competing MPEG-2 video decoder products," said Dolan. The decoder can also accommodate MPEG-2's Simple Profile and Low Delay mode specifications, without bidirectional frames.

Both the MPEG-2 video and MPEG two-channel audio chips use a 0.65-micron process. LSI Logic plans by the summer to integrate the two into a single chip, using the company's recently announced 0.5-micron process.

Motorola also has an aggressive silicon strategy for set-top boxes. The company offers its own MPEG-1 and -2 video and audio decoder chips, and it is said to be working with General Instrument to develop a single-chip solution for MPEG-2 video/DigiCipher-2. Motorola's Kozlowski, however, declined to confirm the reported relationship with GI.

Texas Instruments, meanwhile, recently announced a plan to develop AC-3 audio decoders as well as MPEG audio and video decoders. "We have yet to see some of the key device specifications to be better defined or more widely agreed [on] so that semiconductor companies can make further investment in optimizing circuits and market them as standard products," said Ron Slaymaker, manager of digital compression products for TI's Semiconductor Group. "But we believe that silicon vendors will have a strong role to play in helping drive the cost down by aggressively integrating the current chips inside a set top."

AT&T Microelectronics will also reveal an aggressive strategy for set-top silicon at the Western Cable Show. Robert Copeland, product line director of digital NTSC/PAL at AT&T Microelectronics, claims that in late October the company started sampling "the industry's first working MPEG-2 video decoder chip that fully processes a true MPEG-2 bit stream."

AT&T has opted to bypass MPEG-1, preferring a headlong dive into MPEG-2. At the show, it will demonstrate a real-time MPEG-2 video decoder chip as well a real-time MPEG-2 video encoder system. The latter, box-level system uses six circuit cards—developed by AT&T's Transmission Systems Division—to encode and decode MPEG-2 video on the fly, Copeland said.

AT&T's MPEG-2 video decoder is a hardwired, single-chip solution based on a 0.6-micron double-level metal process and housed in a 160-pin plastic quad flat pack. Unlike LSI Logic's decoder, AT&T's device doesn't handle bidirectional frames. "Our goal was to target minimum cost implementation while making sure to have our chips deployed in the first generation set-top boxes, where the cost is a critical issue," Copeland explained. One planned cost-reduction move for the second-generation silicon, he said, will be a switch from video RAM to DRAM. LSI Logic uses DRAM for its current-generation offering.

Copeland said AT&T will canvass customers regarding additional features for the second-generation silicon, slated for 1994.

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Multichannel News

VOLUME 14 NUMBER 48 NOVEMBER 29, 1993 $4.00

1994 Outlook: Fiber Optics Yes, Digital No

By PETER LAMBERT & LESLIE ELLIS

The much-hyped 500-channel universe will become reality later than promised.

Spurred by the certainty that multichannel competition is coming, cable operators will continue to spend significant amounts of capital on fiber optics, but not on digital compression, in 1994.

Without a doubt, installing fiber at $100 to $120 per subscriber pays off immediately in capacity, flexibility, quality and reliability, executives from a variety of large, mid-sized and small MSOs said last week.

Fortunately, they added, a near glut of optoelectronics competitors has dropped prices through the floor and shot performance through the roof.

MPEG TRADEOFFS

In contrast, they said, the costs and benefits — as well as the performance — of digital video have yet to instill the same confidence. Consequently, digital cable set-top deployment may not appear in even the most aggressive budget plans until at least 1995, and even then may be incremental and slow.

General Instrument Corp. and half a dozen MSOs had projected rollout of DigiCipher digital set-tops in "mid-1994." Now, several MSOs say hardware will not be available by then.

Scientific-Atlanta Inc. will deliver MPEG-2-based terminals for trials by U S West Inc. in Omaha, Neb., and Time Warner Inc. in Orlando, Fla., in the first quarter of 1994.

"After the euphoria comes reality."

Wilt Hildenbrand, vice president of engineering, Cablevision Systems Corp.

However, MSOs planning commercial rollouts are demanding that manufacturers not build set-tops until the MPEG-2 standards are completed — probably no sooner than next spring.

That means GI, S-A and DirecTv/U.S. Satellite Broadcasting supplier Thomson Consumer Electronics face a risk in building boxes that may not match the finalized standards. But the direct-broadcast satellite companies say they'll go ahead with their planning spring launches based on knowledge of MPEG-2 so far.

Further, set-top costs for early adopters will be higher than expected a year ago. As Wilt Hildenbrand, vice president of engineering for Cablevision Systems Corp. put it, "after the euphoria comes reality."

That reality, he suggested, is that MPEG compliance may bring additional costs at first, but bodes well for a long-term drop in costs, by broadening the base of manufacturers competing to provide the equipment.

Yet, several cable engineers indicated they would go very slowly on digital, even if set-tops were to come off assembly lines today.

UNKNOWN PAYBACK

Until consumer demand for near video-on-demand, video games, home shopping and information retrieval becomes known, operators said, digital set-top cost/benefit equations will remain half-empty.

"Whether we can actually take more money out of the house will

See 1994, Page 140

1994 Outlook: Fiber Yes, Digital Compression No

Continued from Page 1

determine whether we're going to spend much money on our plant and on convertors," said Pete Smith, vice president of engineering for Rifkin & Associates.

Sammons is "banking on" digital, said Robert Saunders, the MSO's system vice president of engineering. In its last three upgrades, Sammons has raised the company standard from 550 MHz to 750 MHz, enough capacity to devote 550 MHz to 77 analog channels and reserve 200 MHz for digital.

However, although Sammons last spring committed itself to purchasing 70,000 DigiCipher boxes, "We do not have compression in our '94 budget; fiber is using up all our dollars," Saunders said.

Jones Intercable Inc., Time Warner Cable, Cablevision Industries Inc. and others will forge ahead with aggressive fiber construction schedules over the next several years.

However, said CVI senior vice president Joseph Van Loan, "there are indications there won't be a huge number of digital set-tops available" by late 1994.

Last March, CVI committed itself to outfitting 125,000 of its 1.2 million homes with DigiCipher. Now, he said, "We're asking, 'Is there a place for a simple analog set-top that offers some user-helpful on-screen guides and indexing?' I think the answer is probably yes."

GI, S-A, Zenith Electronics Corp. and others are offering such upgradable options as an analog box with rudimentary on-screen guides in the $150 range, a digital box with on-screen capability in the $250 range and a computer-powered interactive digital box in the $350 range.

While a $100-per-subscriber fiber investment can boost a system to 110 analog channels, Van Loan said, "the question is, will 110 channels do it, or do we need

On-screen guides could be popular in '94.

to make a $250-per-sub investment in compression to get 200 or 300 channels?"

He believes the 300-channel vision will become reality in time, but "the $100 [per-subscriber] investment in fiber expansion may be the better initial move. The longer you can put off a new technology decision, the better; products get better and cheaper over time," he said. Sammons also has "not precluded" rolling out an interim analog box with on-screen navigation, said Saunders.

Mid-size to small operators readily admit that they cannot pioneer in digital. Yet without competitive tools including compression, some wonder how they will survive.

"You've got to see some real strong incremental revenues for a $300 box," said Jeff Marcus, president of 137,500-subscriber Marcus Cable. "We find ourselves waiting for in-the-field experience of others" to judge whether compression will pay for itself.

Marcus has upgraded its systems to 550 MHz, some to 750 MHz, at about $120 per subscriber. It also has acquired systems, making it the third-largest operator in Wisconsin.

Still, Marcus said, "managing through the current environment has never looked more challenging. It sure looks like it's going to be a game for the big boys."

Rifkin's Smith expects to increase construction by 15-20 percent in 1994. "There's not that much uncertainty in terms of how much it costs to build and rebuild," he said, adding that the same cannot be said of compression in 1994. "It's not going to be ready. Even TCI says that."

Whenever it comes, Smith predicted, "the most fortunate systems in this country are the largest systems held by a smaller operator. That's where they're going to put their money [and] innovation."

To date, said David Large, director of engineering for InterMedia Partners, "we're not hearing consistent numbers on costs [or on] what degree of compression will be possible. Is it going to be 6:1? 10:1?"

But like Marcus, Large said unknown Federal Communications Commission cost-of-service rules remain an equally major barrier to investments. Further, new compatibility rules due next April "could point to significant capital issues. Our biggest concern is that those rules don't cripple the introduction of video compression by making it financially unreasonable to deploy a digital set-top." —MCN